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(54) Title: COMPOUNDS AND METHODS TO INCREASE ANTI-P-GLYCOPROTEIN ACTIVITY OF BAICALEIN BY ALKYLATION ON THE A RING

Table 3. Anti-P-gp activity and cytotoxicity of alkylated baicalein compounds.

compd	functional group				c log P <sup>a</sup>	anti-P-gp activity <sup>b</sup>		cytotoxicity (C <sub>50</sub> μM)	
	R <sup>5</sup>	R <sup>6</sup>	R <sup>7</sup>	R <sup>8</sup>		[EC <sub>50</sub> (μM)] <sup>c</sup>	Δ <sub>act</sub> <sup>c</sup>	K <sub>B</sub>	K <sub>D/MDR</sub>
control						0.5±0.1 <sup>d</sup>		0.6±0.2	1.5±0.7
CSA					2.9	1.2±0.3	3.5±0.3	19.6±2.7	51.7±4.7
VRM					4.5	14±1.2	2.2±0.1	62.3±3.7	87.1±3.6
8 OH	OH	OH	OH	H	3.0	4.1±5.1	1.7±0.1	>100	>100
5 OMe	OH	OMe	OMe	H	3.5	4.6±1.1	3.4±0.3	85.9±7.8	57.9±5.9
6 OMe	OMe	OMe	OMe	H	2.9	5.5±0.4	2.7±0.2	>100	>100
19 OH	OH	OCH <sub>3</sub> O	H	H	3.7	6.6±1.3	1.2±0.1	>100	>100
20 OMe	OMe	OCH <sub>3</sub> O	H	H	3.1	4.4±2.1	1.5±0.1	>100	>100
32 OH	OEt	OEt	OH	H	3.6	2.3±0.3	3.5±0.3	24.6±3.5	17.5±5.6
38 OH	OEt	OEt	OMe	H	4.1	1.5±0.2	2.3±0.2	>100	>100
33 OH	OEt	OEt	OEt	H	4.6	1.8±0.2	4.9±0.2	>100	>100
44 OMe	OEt	OEt	OBz	H	3.9	1.1±0.1	4.2±1.1	81.7±7.8	79.2±5.8
17 OH	OPr	OEt	OH	H	4.1	2±0.7	4.7±0.1	58.9±6.3	>100
21 OH	OEt	OEt	OMe	H	4.6	1.2±0.4	4.8±0.1	>100	>100
22 OMe	OEt	OEt	OMe	H	3.9	1.7±0.1	4.8±0.1	>100	>100
18 OH	OEt	OEt	OEt	H	5.6	1.4±0.4	5.0±0.2	>100	>100
23 OMe	OEt	OEt	OEt	H	5.0	0.9±0.1	5.2±0.1	86.4±6.3	93.7±2.2
45 OH	OC <sub>2</sub> H <sub>5</sub>	OC <sub>2</sub> H <sub>5</sub>	OC <sub>2</sub> H <sub>5</sub>	H	6.7	1.5±0.3	1.2±0.1	>100	>100
46 OMe	OC <sub>2</sub> H <sub>5</sub>	OC <sub>2</sub> H <sub>5</sub>	OC <sub>2</sub> H <sub>5</sub>	H	6.1	1.6±0.2	4.4±0.1	>100	>100
40 OH	OC <sub>2</sub> H <sub>5</sub>	OC <sub>2</sub> H <sub>5</sub>	OC <sub>2</sub> H <sub>5</sub>	H	7.8	1.8±0.1	1.1±0.1	>100	>100
41 OMe	OC <sub>2</sub> H <sub>5</sub>	OC <sub>2</sub> H <sub>5</sub>	OC <sub>2</sub> H <sub>5</sub>	H	7.1	1.5±0.1	3.2±0.1	75.4±6.4	82.6±8.4
42 OH	OC <sub>2</sub> H <sub>5</sub>	OC <sub>2</sub> H <sub>5</sub>	OC <sub>2</sub> H <sub>5</sub>	H	8.8	1±0.1	1.0±0.1	>100	>100
43 OMe	OC <sub>2</sub> H <sub>5</sub>	OC <sub>2</sub> H <sub>5</sub>	OC <sub>2</sub> H <sub>5</sub>	H	8.2	1.3±0.2	1.1±0.1	39.1±8.5	44.8±7.9
34 OH	OC <sub>2</sub> H <sub>5</sub>	OC <sub>2</sub> H <sub>5</sub>	OC <sub>2</sub> H <sub>5</sub>	H	10.9	7.4±4.1	1.2±0.1	>100	>100

Mc = methyl, Et = ethyl, Pr = n-propyl and Ph = phenyl.

(57) Abstract: The present invention is directed to analogs of baicalein according to formula (I): where R<sup>5</sup> is H, (C<sub>1</sub>-C<sub>12</sub>)alkyl, (C<sub>2</sub>-C<sub>13</sub>)acyl, or an optionally substituted phenyl or benzyl group, an acyl group, a C<sub>1</sub>-C<sub>20</sub> alkyl or ether group, a phosphate, diphosphate, triphosphate or phosphodiester group; R<sup>6</sup> and R<sup>7</sup> are each independently H, (C<sub>1</sub>-C<sub>12</sub>)alkyl, (C<sub>2</sub>-C<sub>13</sub>)acyl, or an optionally substituted phenyl or benzyl or together form a -OCR<sup>1</sup>R<sup>2</sup>O- group wherein each of R<sup>1</sup> and R<sup>2</sup> is independently H, a C<sub>1</sub>-C<sub>3</sub> alkyl group or an optionally substituted phenyl or benzyl group; and R<sup>8</sup> is H, OH, an O-acyl group; a C<sub>1</sub>-C<sub>4</sub> alkyl or alkoxy group, F, Cl, Br or I, or a pharmaceutically acceptable salt thereof, which exhibit anti-P-glycoprotein activity and methods of enhancing the bioavailability of active compounds, especially orally administered compounds, by inhibition of P-glycoprotein 170 (P-gp 170) and/or CYP450 enzyme, especially CYP450 3A4 enzyme. Pharmaceutical compositions based upon these novel derivatives according to the present invention are also described herein.

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